

Appendix H
**Population Structure of
Salmonid ESUs and DPSs in California**

Appendix H

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Within California there are two distinct evolutionarily significant units (ESUs) of Coho salmon, five ESUs of Chinook salmon and six distinct population segments (DPSs) of steelhead that occupy the waters affected by the Program (see Table H-1).

Table H-1. Federal and State Protected Salmon and Steelhead in California

ESU Common Name	Scientific Name	State Status	Federal Status
Chinook salmon, Upper Klamath/Trinity Rivers	<i>Oncorhynchus tshawytscha</i>	SSC	
Chinook salmon, California coast	<i>Oncorhynchus tshawytscha</i>		T
Chinook salmon, Central Valley fall/late fall run	<i>Oncorhynchus tshawytscha</i>	SSC	
Chinook salmon, Central Valley spring run	<i>Oncorhynchus tshawytscha</i>	T	T
Chinook salmon, Sacramento River winter run	<i>Oncorhynchus tshawytscha</i>	E	E
Coho salmon, southern Oregon/northern California coast	<i>Oncorhynchus kisutch</i>	T	T
Coho salmon, central California coast	<i>Oncorhynchus kisutch</i>	E	E
Steelhead, Klamath Mountains Province	<i>Oncorhynchus mykiss</i>	SSC	
Steelhead, central California coast	<i>Oncorhynchus mykiss</i>		T
Steelhead, California Central Valley	<i>Oncorhynchus mykiss</i>		T
Steelhead, northern California	<i>Oncorhynchus mykiss</i>	SSC	T
Steelhead, southern California	<i>Oncorhynchus mykiss</i>	SSC	E
Steelhead, south-central California coast	<i>Oncorhynchus mykiss</i>	SSC	T

Notes:

T = threatened under the federal Endangered Species Act and the California Endangered Species Act.
 E = endangered under the federal Endangered Species Act and the California Endangered Species Act.
 SSC = California Department of Fish and Game species of special concern.

The population structure of each ESU/DPS is described in the following sections. Populations were classified using slightly different criteria depending on the ESU.

The National Oceanic and Atmospheric Administration NOAA (Bjorkstedt et al. 2005) divided the historical populations of Chinook, Coho, and steelhead in the north-central California coast into three classifications.

- “Functionally independent populations” are those for which the probability of extinction over a 100-year period is unaffected by migrants from neighboring populations.
- “Potentially independent populations” have a low 100-year extinction risk but are too strongly influenced by immigration from other populations to exhibit independent dynamics.
- “Dependent populations” have substantial likelihood extinction over a 100-year period unless bolstered by immigrants from other populations.

NOAA (Williams et al. 2006) divided the Coho populations in the southern Oregon/northern California coast ESU into three classifications, the same three classifications as Bjorkstedt et al. (2005).

NOAA (Lindley et al. 2004) divided the Central Valley spring-run and winter-run Chinook populations into three slightly different classifications:

- “Independent populations” are those for which the probability of extinction over a 100-year period is unaffected by migrants from neighboring populations. Such populations are also substantially reproductively isolated (distance to nearest neighbor 50 kilometers [km] or more) and relatively large in size (watershed area 500 km² or more).
- “Dependent populations” are those that would not historically have been self-sustaining without immigration from neighboring populations.
- “Others” are extant populations that do not represent historical populations. In other words, these populations currently exist because of unique habitat features that exist today.

NOAA (Lindley et al. 2006) only described independent populations of steelhead in the Central Valley Steelhead ESU. They identified independent populations as, “Any collection of one or more breeding units whose population dynamics or extinction risk over a 100-year time period is not substantially altered by exchanges of individuals with other populations.” Patches of suitable habitat that were within 35 km of each other were grouped as independent populations.

Finally, population structure has not been defined for three ESUs because they are not listed under the federal Endangered Species Act (ESA). These ESUs are Central Valley fall-run Chinook, upper Klamath-Trinity Rivers Chinook, and Klamath Mountains Province steelhead.

Chinook Salmon, Upper Klamath/Trinity Rivers ESU

This ESU includes all naturally spawning Chinook in the Klamath and Trinity Basins upstream of the confluence of the Klamath and the Trinity Rivers; it is not listed under the federal Endangered Species Act and population structure has not been defined.

Fall-, late fall-, and spring-run Chinook spawn and rear in the Trinity River and in the Klamath River upstream of the mouth of the Trinity River. In the Trinity River, Chinook salmon spawn in the main stem as far upstream as Lewiston Dam, the north and south forks, Hayfork Creek, Mill Creek, New River, and Canyon Creek (Moyle et al. 2008). In the Klamath River, Chinook salmon once ascended into Upper Klamath Lake, Oregon, to spawn in the major tributaries to the lake (Williamson, Sprague, and Wood Rivers), but access to this region was blocked in 1917 by Copco Dam. Today, Chinook are known to spawn in the main stem Klamath River, Bogus Creek, Shasta River, Scott River, Indian Creek, Elk Creek, Clear Creek, the Salmon River (spring-run), Bluff Creek, Blue Creek, and the lower reaches of some of the other smaller tributaries to the main stem river (Moyle et al. 2008).

Chinook Salmon, California Coast ESU

This ESU includes all naturally spawned populations of Chinook salmon occurring in streams and rivers of the California coast south of the Klamath River to, and including, the Russian River.

NOAA (Bjorkstedt et al. 2005) described the historical ESU as consisting of 15 independent and 17 dependent populations (Table H-2). Geographic, genetic, and environmental factors were used to assign a population status to each subpopulation. Of the 32 historic populations defined by the Technical Recovery Team, 14 independent populations and four dependent populations are believed by NOAA to exist today (National Marine Fisheries Service 2005a).

Table H-2. Populations in the California Coast Chinook ESU and Their Classification, Ordered North to South

Population	Classification
Redwood Creek	Functionally independent
Little River	Potentially independent
Mad River	Functionally independent
Humboldt Bay	Potentially independent
Lower Eel River	Functionally independent
Upper Eel River	Functionally independent
Bear River	Potentially independent
Mattole River	Functionally independent
Usal Creek	Dependent
Cottaneva Creek	Dependent
DeHaven Creek	Dependent
Wages Creek	Dependent
Ten Mile River	Functionally independent
Pudding Creek	Dependent
Noyo River	Functionally independent
Hare Creek	Dependent
Caspar Creek	Dependent
Big River	Functionally independent
Albion River	Dependent
Big Salmon Creek	Dependent
Navarro River	Functionally independent
Greenwood Creek	Dependent
Elk Creek	Dependent
Alder Creek	Dependent
Brush Creek	Dependent
Garcia River	Potentially independent
Gualala River	Potentially independent
Russian River	Functionally independent
Salmon Creek	Dependent
Americano Creek	Dependent
Stemple Creek	Dependent
Tomales Bay	Dependent

Source: Bjorkstedt et al. 2005.

Chinook Salmon, Central Valley Fall-/Late Fall–Run ESU

This ESU includes all naturally spawned populations of fall-run and late fall–run Chinook salmon in the Sacramento and San Joaquin River Basins and their tributaries, east of Carquinez Strait. The National Marine Fisheries Service (NMFS) determined that listing was not warranted on September 16, 1999, but classified the ESU as a species of concern on April 15, 2004, primarily because of uncertainty regarding the status of the naturally spawning populations. Except for Central Valley winter Chinook, which are largely restricted to the main stem Sacramento River between Keswick Dam and Red Bluff Dam, the existing Central Valley fall-run Chinook population is unique among North American Chinook ESUs in having little or no detectable geographically structured genetic variation (Williamson and May 2005; Banks et al. 2000). The degree of geographically structured genetic diversity in the historical population is unknown, although it was almost certainly much greater than at present unless highly variable hydrologic conditions prevented the establishment of local adaptations (Lindley et al. 2009). Although Central Valley late fall–run Chinook are genetically distinguishable from fall-run Chinook, they are still closely related and have been included in the same ESU (Myers et al. 1998).

Populations were defined based on populations described in the California Department of Fish and Game (DFG) Grand Tab worksheet. Populations included in the analysis were those reported in the last 5 years to have fall-run Chinook (see Table H-3).

Table H-3. Populations in the Central Valley Fall-Run and Late Fall–Run Chinook ESU Used in the Analysis, Ordered North to South

Population	Location
Sacramento River fall Chinook (natural)	Sacramento River
Clear Creek fall Chinook (natural)	Sacramento River
Cow Creek fall Chinook (natural)	Sacramento River
Cottonwood Creek fall Chinook (natural)	Sacramento River
Battle Creek fall Chinook	Sacramento River
Battle Creek late fall Chinook	Sacramento River
Mill Creek fall Chinook (natural)	Sacramento River
Deer Creek fall Chinook (natural)	Sacramento River
Butte Creek fall Chinook (natural)	Sacramento River
Feather River fall Chinook	Sacramento River
Yuba River fall Chinook (natural)	Sacramento River
American River fall Chinook	Sacramento River
Merced River fall Chinook	San Joaquin River
Tuolumne River fall Chinook (natural)	San Joaquin River
Stanislaus River fall Chinook (natural)	San Joaquin River
Mokelumne River fall Chinook	San Joaquin River

Note:

Populations were defined from DFG Grand Tab worksheet. No classification of population type has been made.

Chinook Salmon, Central Valley Spring-Run ESU

Historically, there were 19 independent populations and eight dependent populations of spring-run Chinook salmon in the Central Valley (Lindley et al. 2004). Now, there are three independent¹ (Butte, Mill, and Deer) and six dependent (Antelope, Big Chico, Clear, Thomes, Cottonwood/Beegum, and Stony) populations remaining, along with one “other” hatchery-natural integrated population in the Feather River and one “other” population in the Sacramento River below Keswick Dam (Lindley et al. 2004) (Table H-4).

Table H-4. Populations in the Central Valley Spring-run Chinook ESU and Their Classification, Ordered North to South

Population	Classification
Butte Creek spring Chinook (natural)	Independent
Deer Creek spring Chinook (natural)	Independent
Mill Creek spring Chinook (natural)	Independent
Antelope spring Chinook (natural)	Dependent
Battle Creek spring Chinook (natural)	Dependent
Beegum-Cottonwood spring Chinook (natural)	Dependent
Big Chico spring Chinook (natural)	Dependent
Clear Creek spring Chinook (natural)	Dependent
Stony Creek spring Chinook (natural)	Dependent
Thomes spring Chinook (natural)	Dependent
Feather River spring Chinook (integrated)	Other
Sacramento River spring Chinook (natural production above Red Bluff Diversion Dam)	Other

Source: Lindley et al. 2004.

Chinook Salmon, Sacramento River Winter-Run ESU

Lindley et al. (2004) state that the historical winter-run Chinook population spawned exclusively in larger spring-fed streams in the South Cascades, generally above 500 meters (m) elevation. The restriction of winter-run Chinook to a single physiographic region is based on the spring and mid-summer spawning time of the run: because of its permeable basalt geology, only the south Cascades contains spring-fed streams that are cool enough for winter-run spawners and eggs. Lindley et al. estimate that four independent populations of winter-run Chinook existed in the south Cascades before construction of Shasta and Keswick Dams. These populations were the Hat Creek and Fall River population (Pit River tributaries), the Little Sacramento River population, the McCloud River population, and the Battle Creek population.

Currently the ESU consists only of a single (necessarily independent) population spawning in the main stem Sacramento between Keswick Dam and Red Bluff Dam.

¹ Mill and Deer Creek were analyzed as two independent populations.

Coho Salmon, Southern Oregon/Northern California Coast ESU

The southern Oregon/northern California coast Coho ESU includes all naturally spawned populations of Coho salmon in coastal streams between Cape Blanco, Oregon, and Punta Gorda, California, as well as three artificial propagation programs: the Cole M. Rivers Hatchery, Trinity River Hatchery, and the Iron Gate Hatchery Coho programs (Williams et al. 2006).

NOAA (Williams et al. 2006) has defined 45 natural populations that were historically part of this ESU (Table H-5). Note that three of these populations are located in Oregon rivers and, as such, are not included in this analysis. They are simply included for completeness. Twenty-nine of these populations are or were independent populations while 16 were considered dependent. Of the 45 populations defined, 27 of the independent populations and 11 of the dependent populations in California are believed by the DFG still to have Coho (Haney 2009).

Table H-5. Populations in the Southern Oregon/Northern California Coho ESU and Their Classification

Subbasin	Population	Classification
Rogue River Basin	Illinois River ¹	Functionally independent
	Middle Rogue/Applegate Rivers ¹	Functionally independent
	Upper Rogue River ¹	Functionally independent
	Lower Rogue River ¹	Potentially independent
	Mussel Creek ¹	Dependant
	Euchre Creek ¹	Dependant
	Hunter Creek ¹	Dependant
	Pistol River ¹	Dependant
	Chetco River ¹	Functionally independent
	Elk River ¹	Functionally independent
	Mill Creek ¹	Dependent
	Hubbard Creek ¹	Dependent
	Brush Creek ¹	Dependent
Winchuck River ¹	Potentially independent	
Klamath/Trinity	Salmon River	Potentially independent
	Scott River	Functionally independent
	Middle Klamath River	Potentially independent
	Upper Klamath River	Functionally independent
	Shasta River	Functionally independent
	Lower Trinity River	Potentially independent
	Upper Trinity River	Functionally independent
	South Fork Trinity River	Functionally independent
Lower Klamath River	Functionally independent	

Subbasin	Population	Classification
Eel River Basin	South Fork Eel River	Functionally independent
	Main stem Eel River	Potentially independent
	Middle Main stem Eel River	Functionally independent
	Upper Main stem Eel River	Potentially independent
	North Fork Eel River	Potentially independent
	Middle Fork Eel River	Potentially independent
Southern Coastal Basins	Humboldt Bay tributaries	Functionally independent
	Lower Eel/Van Duzen Rivers	Functionally independent
	Guthrie Creek	Dependent
	Bear River	Potentially independent
	McNutt Gulch	Dependent
	Mattole River	Functionally independent
Northern Coastal Basins	Smith River	Dependent
	Elk Creek	Functionally independent
	Wilson Creek	Dependent
	Redwood Creek	Functionally independent
Central Coastal Basins	McDonald Creek	Dependent
	Maple Creek/Big Lagoon	Potentially independent
	Little River	Potentially independent
	Strawberry Creek	Dependent
	Norton/Widow White Creek	Dependent
	Mad River	Functionally independent

Source: Williams et al. 2006.

Note: ¹Located in Oregon.

Coho Salmon, Central California Coast ESU

The central California coast Coho ESU includes all naturally spawned populations of Coho salmon from Punta Gorda in northern California south to and including the San Lorenzo River in central California. Populations in tributaries to San Francisco Bay, excluding the Sacramento–San Joaquin system, are also included as part of the ESU. Fish produced by the Don Clausen Fish Hatchery Captive Broodstock Program, Scott Creek/King Fischer Flats Conservation Program, Scott Creek Captive Broodstock program, and the Noyo River Fish Station Egg-take Program are included in the ESU.

NOAA (Bjorkstedt et al. 2005) has defined 12 independent and 62 dependent populations that historically made up this ESU (Table H-6). Information on abundance and populations structure of the central California coast Coho ESU is extremely limited but available information points to a declining trend in abundance (Good et al. 2005). Of the 74 populations defined, 12 of the independent populations and 33 of the dependent populations are believed by DFG to still have Coho (Haney 2009).

Table H-6. Populations in the Central California Coast Coho ESU and Their Classification

Population	Classification
Abalobadiah Creek	Dependent
Alameda Creek	Dependent
Albion River	Functionally independent
Alder Creek	Dependent
Americano Creek	Dependent
Aptos Creek	Dependent
Arroyo Corte Madera del Presidio	Dependent
Arroyo de los Frijoles	Dependent
Big River	Functionally independent
Big Salmon Creek	Dependent
Bodega Harbor	Dependent
Brush Creek	Dependent
Cascade Creek	Dependent
Caspar Creek	Dependent
Corte Madera Creek	Dependent
Cottaneva Creek	Dependent
Coyote Creek	Dependent
DeHaven Creek	Dependent
Drakes Bay	Dependent
Elk Creek	Dependent
Garcia River	Functionally independent
Gazos Creek	Dependent
Greenwood Creek	Dependent
Guadalupe River	Dependent
Gualala River	Functionally independent
Hare Creek	Dependent
Howard Creek	Dependent
Jackass Creek	Dependent
Juan Creek	Dependent
Jug Handle Creek	Dependent
Lagunitas Creek	Functionally independent
Little River	Dependent
Mallo Pass Creek	Dependent
Mill Creek	Dependent
Miller Creek	Dependent
Napa River	Dependent
Navarro River	Functionally independent
Novato Creek	Dependent
Noyo River	Functionally independent
Pescadero Creek	Functionally independent

Population	Classification
Petaluma River	Dependent
Pilarcitos Creek	Dependent
Pine Gulch	Dependent
Point Arena Creek	Dependent
Pomponio Creek	Dependent
Pudding Creek	Dependent
Redwood Creek	Dependent
Russian Gulch	Dependent
Russian Gulch	Dependent
Russian River	Functionally independent
Salmon Creek	Dependent
San Francisquito Creek	Dependent
San Gregorio Creek	Dependent
San Leandro Creek	Dependent
San Lorenzo Creek	Dependent
San Lorenzo River	Functionally independent
San Mateo Creek	Dependent
San Pablo Creek	Dependent
San Vicente Creek	Dependent
Schooner Gulch	Dependent
Scott Creek	Dependent
Scotty Creek	Dependent
Sonoma Creek	Dependent
Soquel Creek	Dependent
Stemple Creek	Dependent
Stevens Creek	Dependent
Ten Mile River	Functionally independent
Tunitas Creek	Dependent
Usal Creek	Dependent
Waddell Creek	Dependent
Wages Creek	Dependent
Walker Creek	Potentially independent
Whitehouse Creek dependent	Dependent
Wilder Creek	Dependent

Source: Bjorkstedt et al. 2005

Steelhead, Klamath Mountains Province DPS

This DPS covers portions of Northern California (Klamath and Smith Rivers) and Southern Oregon (Chetco, RogueRogue, and Elk Rivers). The NMFS has determined that this DPS does not warrant listing under the Endangered Species Act (50 Code of Federal Regulations [CFR] Part 223, April 4, 2001). This analysis, however, focuses only on the basins/populations and hatchery programs within California (Klamath and Smith Rivers).

This Klamath Mountains Steelhead DPS includes five California populations, assumed to be independent because of their geographic isolation and/or disjunct spawning timing. These five populations are: 1) Smith River winter steelhead, 2) Trinity River summer steelhead, 3) Trinity River winter steelhead, 4) Klamath winter steelhead, and 5) Klamath summer steelhead. Summer-run steelhead in the Klamath and Trinity Rivers occur primarily in the upper portions of the basins.

Steelhead, Central California Coast DPS

This DPS includes all naturally and artificially spawned anadromous steelhead populations below impassable natural and constructed barriers in California streams from the Russian River (inclusive) to Aptos Creek (inclusive), and the drainages of San Francisco, San Pablo, and Suisun Bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers. Tributary streams to Suisun Marsh include Suisun Creek, Green Valley Creek, and an unnamed tributary to Cordelia Slough (commonly referred to as Red Top Creek); excluded are the Sacramento-San Joaquin River Basin and two artificial propagation programs: the Don Clausen Fish Hatchery and Kingfisher Flats Hatchery/Scott Creek Steelhead Hatchery projects (Bjorkstedt et al. 2005).

NOAA (Bjorkstedt et al. 2005) identified 63 winter steelhead populations that historically made up this DPS (Table H-7). Thirty-seven populations are considered independent and 26 are considered to be dependent. Of the 63 populations defined, 30 of the independent populations and 18 of the dependent winter steelhead populations are believed by NOAA and DFG still to have steelhead (National Marine Fisheries Service 2005b).

Table H-7. Populations in the Central California Coast Steelhead DPS, Ordered North to South

Population	Classification
Kolmer Creek	Dependent
Fort Ross Creek	Dependent
Russian Gulch	Dependent
Scotty Creek	Dependent
Salmon Creek	Potentially independent
Bodega Harbor	Dependent
Americano Creek	Potentially independent
Stemple Creek	Potentially independent
Tomales Bay	Potentially independent
Walker Creek	Potentially independent
Lagunitas Creek	Potentially independent
Drakes Bay	Dependent
Pine Gulch	Dependent
Redwood Creek	Dependent
Pilarcitos Creek	Potentially independent
Canada Verde Creek	Dependent
Tunitas Creek	Dependent
San Gregorio Creek	Functionally independent
Pomponio Creek	Dependent
Pescadero Creek	Functionally independent
Arroyo de los Frijoles	Dependent
Gazos Creek	Dependent
Whitehouse Creek	Dependent
Cascade Creek	Dependent
Green Oaks Creek	Dependent
Ano Nuevo Creek	Dependent
Waddell Creek	Potentially independent
Scott Creek	Potentially independent
Molino Creek	Dependent
San Vicente Creek	Dependent
Liddell Creek	Dependent
Laguna Creek	Potentially independent
Baldwin Creek	Dependent
Wilder Creek	Dependent
San Lorenzo River	Functionally independent
Rodeo Creek Gulch	Dependent
Soquel Creek	Potentially independent
Aptos Creek	Potentially independent
Lower Russian River	Dependent
Austin Creek	Potentially independent
Dutch Bill Creek	Dependent

Population	Classification
Green Valley Creek	Potentially independent
Mark West Creek	Potentially independent
Dry Creek	Potentially independent
Maacama Creek	Potentially independent
Sausal Creek	Dependent
Upper Russian River	Functionally independent
Arroyo Corte Madera del Presidio	Dependent
Corte Madera Creek	Potentially independent
Miller Creek	Potentially independent
Novato Creek	Potentially independent
Petaluma River	Potentially independent
Sonoma Creek	Functionally independent
Napa River	Functionally independent
San Pablo Creek	Potentially independent
San Leandro Creek	Functionally independent
San Lorenzo Creek	Functionally independent
Alameda Creek	Functionally independent
Coyote Creek	Functionally independent
Guadalupe River	Functionally independent
Stevens Creek	Potentially independent
San Francisquito Creek	Potentially independent
San Mateo Creek	Potentially independent

Source: Bjorkstedt et al. 2005.

Steelhead, California Central Valley DPS

The California Central Valley steelhead DPS includes all naturally spawned populations of steelhead and their progeny in the Sacramento and San Joaquin Rivers and their tributaries, but excluding steelhead from San Francisco and San Pablo Bays and their tributaries. The DPS also includes artificially propagated steelhead stocks from Coleman National Fish Hatchery on Battle Creek and from the Feather River Hatchery. Other anadromous hatchery steelhead stocks propagated within the DPS boundaries but not included in the DPS are the Nimbus Hatchery program (American River) and the Mokelumne River Hatchery program.

Lindley et al. (2006) estimated the historical number of independent populations by a multiphase modeling process. The result of their analyses was the identification of 81 independent steelhead populations and almost 25,000 km of habitat believed to have existed in historical times (Table H-8). The analysis did not include the identification of dependent populations.

Table H-8. Populations in the California Central Valley Steelhead DPS

Basin	Total Stream (km)	Streams
American River	1,357.1	Auburn Ravine, north fork
Antelope Creek	176.5	Cold fork
Battle Creek	349.1	Knob Gulch, north fork, Rock Creek
Battle Creek	122.8	Middle fork, south fork
Bear River (Sacramento tributary)	51.5	Digger Creek, south fork Bear Creek
Bear River (Feather tributary)	356.1	Long Valley Creek
Bear River (Feather tributary)	58.5	North fork
Big Chico Creek	114.9	East Branch Mud Creek
Big Chico Creek	46.8	Rock Creek, main stem
Big Chico Creek	30.9	South fork
Butte Creek	269.4	Main stem
Butte Creek	29.2	Middle fork
Cache Creek	1,100	Deer Creek, Dry Creek, Wolf Creek, main stem
Calaveras River	22.8	Main stem
Calaveras River	71.9	McKinney Creek, O'Neil Creek
Calaveras River	34.6	San Antonio Creek, San Domingo Creek
Calaveras River	14.5	Woods Creek
Caliente Creek	12.4	Indian Creek
Caliente Creek	60.5	Tehachapi Creek
Caliente Creek	75.8	Walker Basin
Chowchilla River	12.9	Main stem
Chowchilla River	61.3	Willow Creek, main stem
Clear Creek	255.7	Crystal Creek, main stem
Coon Creek1	15.6	Main stem
Coon Creek2	38.9	Main stem
Cosumnes River	587.8	Cedar Creek, middle fork, north fork, south fork
Cottonwood Creek	62.4	Duncan Creek, Soap Creek, main stem
Cottonwood Creek	55.2	Jerusalem Creek, Moon Fork, north fork Bear Creek
Cottonwood Creek	16.8	Main stem
Cottonwood Creek	121.2	Main stem
Cottonwood Creek	44.2	South fork
Cottonwood Creek	96.8	Wells Creek
Deer Creek Kaweah tributary)	46.2	Bull Run Creek, Chimney Creek, south fork
Deer Creek (Sacramento tributary)	299.4	Little Dry Creek
Del Puerto Creek	33.8	Whiskey Creek

Basin	Total Stream (km)	Streams
Elder Creek	59.3	North fork, main stem
Feather River	14.4	Briscoce Creek
Feather River	5,193.5	Elk Creek, west branch Rocky Honcut Creek, Canyon Creek, Concow Creek, Little Butte Creek, middle fork, north fork
Feather River	41.7	Big Creek, north fork
Fresno River	38.6	Main stem
Kaweah River	42.9	South fork Tule Creek
Kaweah River	11.6	Tyler Creek
Kaweah River	20.9	Fay Creek, Kelso Creek, Marsh Creek
Kern River	693	French Gulch Creek, Little Poso Creek, Tillie Creek
Kern River	532.2	North fork
Kern River	35.1	Bitterwater Canyon, south fork, main stem
Kings River	123.3	South fork
Kings River	20.6	Cedar Creek, main stem
Little Cow Creek	83.5	Clover Creek
Little Cow Creek	33.3	Glendenning Creek, Old Cow Creek
Little Cow Creek	88.5	South Cow Creek
Little Cow Creek	59.4	East fork
Lone Tree Creek	28.5	MF Tule River
Los Banos Creek	10.2	Main stem
Los Gatos Creek	19.5	Rube Creek
Los Gatos Creek	20.1	South fork
Marsh Creek	82.9	Nosoni Creek, main stem
McCloud River	1,201.2	Middle fork, Miami Creek, main stem
Merced River	227.9	Snow Creek
Merced River	18.1	North fork Willow Creek
Mill Creek	258.7	North fork
Mokelumne River	276.8	Sutter Creek, main stem
Mokelumne River	53.3	Warthan Creek
Panoche Creek	11.4	Beegum Creek
Paynes Creek	29.9	Potem Creek, main stem
Pit River	3,948	Squaw Creek
Pit River	146.5	Alama Creek, Indian Creek
Poso Creek	168.5	Scott Creek
Putah Creek	982.2	Curtic Creek
Stanislaus River	218.3	Grindstone Creek, north fork, south fork, Salt Creek
Stony Creek	184.6	Little Stony Creek, Salt Creek,
Stony Creek	237.2	

Basin	Total Stream (km)	Streams
		South Honcut Creek
Suisun Bay tributaries, northern		
Kelso Creek	573.1	Sullivan Creek, main stem
Sweany Creek	127.6	Jesus Maria Creek
Thomes Creek	179.1	Maple branch, Mud Creek
Toomes Creek	34.4	Big Dry Creek, main stem
		Bear Creek, Corral Hollow Creek, Maxwell Creek, Moccasin Creek, main stem
Tuolumne River	323.9	
Upper Sacramento River	766.6	Sugarloaf Creek, main stem
		Clear Creek, Erskine Creek, Mill Flat Creek, main stem
Upper San Joaquin River	205.8	
Yuba River	1,077.1	Dry Creek, main stem
Yuba River	138.4	Main stem

Source: Lindley et al. 2006.

Note: All populations were classified as independent.

Table H-9 identifies the current known and suspected distribution of natural steelhead spawning and rearing in the Central Valley (Good et al. 2005). From the 81 historical independent populations, steelhead production has dropped to 33 spawning aggregates, 27 in the Sacramento Basin and six in the San Joaquin Basin. Good et al. do not identify any of the existing populations as viable and independent.

Table H-9. Summary of Current Distribution of Steelhead in the California Central Valley Steelhead DPS, Ordered North to South

Location	Current Presence	Most Recent Documented Date of Presence	Count/ life stage	Comments
Clear Creek	Yes	2001	Adults/juveniles	Snorkel surveys, redd counts, rotary screw traps
Rock Creek	Probable	2001	Adults/juveniles	Creek used for spawning
Salt Creek	Probable	2001	Adults/juveniles	Possible , non-natal rearing
Sulphur Creek	Probable	2001	Adults/juveniles	Creek used for spawning
Olney Creek	Probable	2001	Adults/juveniles	Spawning, non-natal rearing
Stillwater Creek	Probable	-	-	Non-natal rearing
Cow Creek and tributaries	Probable	1992	-	Suitable habitat but access problems
Cottonwood Creek	Probable	-	-	
Beegum Creek	Yes	2001	Adults	
South fork Cottonwood Creek	Possible	-	-	Large population of "rainbow trout"
Bear Creek	Possible	-	-	-
Battle Creek	Yes	2002	-	-
Paynes Creek	Yes	2002	Adults	Self-sustaining population unlikely
Antelope Creek	Yes	2001	Adults + redds	
Mill Creek	Yes	2001	Adults + redds	Small numbers counted
Elder Creek	Possible	No recent surveys	-	Resident trout present
Thomes Creek	Probable	1969 and 2002	-	Used by chinook salmon, "trout" observed trout present
Deer Creek	Yes	2001	Adults + redds	
Rice Creek	Yes	1998	Juveniles	
Big Chico Creek	Yes	-	-	
Butte Creek	Yes	2000	-	Report confirms steelhead presence; no details
Feather River	Yes	1998	Young of year + juveniles	Screw trap captures
Yuba River	Yes	1998	-	Report confirms steelhead presence; no details

Location	Current Presence	Most Recent Documented Date of Presence	Count/ life stage	Comments
Deer Creek (Yuba River tributary)	Yes	1998	Adults	Dive survey
Dry Creek	Yes	-	-	Secret and Miners Ravines
American River	Yes	2002	Adults + redds	Adult numbers estimated from redd counts
Putah Creek	Yes	2000	-	Very small number of adult steelhead reach base of Monticello Dam
Cosumnes River	Yes	1995	-	Smolts salvaged from drying pools
Mokelumne River	Yes	2001	Adults/juveniles	
Calaveras River	Yes	2001	Adults/juveniles	Several reports list presence but do not give details; angler photos, reports
Stanislaus River	Yes	2001	Young of year and age 1+	
Tuolumne River	Yes	2001	Juveniles	Incidental rotary screw trap captures
Merced River	Possible	2002	Juveniles	Incidental rotary screw trap captures, large trout caught by anglers, enter hatchery

Source: Good et al. 2005.

Note:

- = No data.

Steelhead, Northern California DPS

This DPS was listed as threatened under the ESA in 2000 and includes all naturally spawned anadromous steelhead populations below natural and constructed impassable barriers in California coastal river basins from Redwood Creek (Orick) southward to, but not including, the Russian River, as well as two artificial propagation programs: the Yager Creek Hatchery (discontinued) and the North Fork Gualala River Hatchery (converted to a rescue rearing program) (Bjorkstedt et al. 2005). The only steelhead program currently operating in the geographic boundaries of this DPS is the DFG Mad River Hatchery. These fish are not considered part of the Northern California DPS.

NOAA (Bjorkstedt et al. 2005) identified 108 winter steelhead and 10 summer steelhead populations that historically made up this DPS (Table H-10). All of the summer steelhead populations are considered to be independent; 43 of the winter populations are considered to be independent, and 65 are considered to be dependent. Of the 118 populations defined, all 10 of the independent summer steelhead, 29 of the independent winter steelhead populations, and 49 of the dependent winter steelhead populations still produce steelhead (National Marine Fisheries Service 2004; Haney 2007).

Table H-10. Populations in the Northern California Steelhead DPS, Ordered North to South

Run	Stream/Population	Classification
Winter	Butler Creek	Dependent
	Boat Creek	Dependent
	Fern Canyon	Dependent
	Squashan Creek	Dependent
	Gold Bluff	Dependent
	Redwood Creek	Functionally independent
	McDonald Creek	Dependent
	Maple Creek/Big Lagoon	Potentially independent
	Little River	Potentially independent
	Strawberry Creek	Dependent
	Widow White Creek	Dependent
	Mad River	Functionally independent
	Humboldt Bay	Potentially independent
	Fleener Creek	Dependent
	Guthrie Creek	Dependent
	Oil Creek	Dependent
	Bear River	Potentially independent
	Singley Creek	Dependent
	Davis Creek	Dependent
	Domingo Creek	Dependent
	McNutt Gulch	Dependent
	Peter Gulch	Dependent
	Mattole River	Functionally independent
	Fourmile Creek	Dependent
	Cooskie Creek	Dependent
	Randall Creek	Dependent
	Spanish Creek	Dependent
	Oat Creek	Dependent
	Big Creek	Dependent
	Big Flat Creek	Dependent
	Shipman Creek	Dependent
	Gitchell Creek	Dependent
	Horse Mountain Creek	Dependent
	Telegraph Creek	Dependent
	Humboldt Creek	Dependent
	Whale Gulch	Dependent
	Jackass Creek	Dependent
	Little Jackass Creek	Dependent
	Usal Creek	Potentially independent
	Cottaneva Creek	Potentially independent
Hardy Creek	Dependent	

Run	Stream/Population	Classification
	Juan Creek	Dependent
	Howard Creek	Dependent
	DeHaven Creek	Dependent
	Wages Creek	Potentially independent
	Chadbourne Gulch	Dependent
	Abalobadiah Creek	Dependent
	Seaside Creek	Dependent
	Ten Mile River	Functionally independent
	Inglenook Creek	Dependent
	Mill Creek	Dependent
	Virgin Creek	Dependent
	Pudding Creek	Potentially independent
	Noyo River	Functionally independent
	Hare Creek	Potentially independent
	Digger Creek	Dependent
	Mitchell Creek	Dependent
	Jug Handle Creek	Dependent
	Caspar Creek	Potentially independent
	Russian Gulch	Potentially independent
	Jack Peters Creek	Dependent
	Big River	Functionally independent
	Little River	Dependent
	Buckhorn Creek	Dependent
	Dark Gulch	Dependent
	Albion River	Functionally independent
	Big Salmon Creek	Potentially independent
	Navarro River	Functionally independent
	Greenwood Creek	Dependent
	Elk Creek	Potentially independent
	Mallo Pass Creek	Dependent
	Alder Creek	Potentially independent
	Brush Creek	Potentially independent
	Garcia River	Functionally independent
	Point Arena Creek	Dependent
	Moat Creek	Dependent
	Ross Creek	Dependent
	Galloway Creek	Dependent
	Schooner Gulch	Dependent
	Slick Rock Creek	Dependent
	Signal Port Creek	Dependent
	Saint Orres Creek	Dependent
	Gualala River	Functionally independent

Run	Stream/Population	Classification
	Miller Creek	Dependent
	Stockhoff Creek	Dependent
	Timber Cove Creek	Dependent
	Lower main stem Eel River	Dependent
	Price Creek	Potentially independent
	Howe Creek	Dependent
	Larabee Creek	Potentially independent
	Van Duzen River	Functionally independent
	South fork Eel River	Functionally independent
	Lower middle main stem Eel River	Dependent
	Dobbyn Creek	Potentially independent
	Jewett Creek	Potentially independent
	Pipe Creek	Potentially independent
	Kekwaka Creek	Potentially independent
	Chamise Creek	Potentially independent
	North fork Eel River	Functionally independent
	Upper middle main stem Eel River	Dependent
	Bell Springs Creek	Potentially independent
	Woodman Creek	Potentially independent
	Burger Creek	Potentially independent
	Outlet Creek	Potentially independent
	Tomki Creek	Potentially independent
	Middle fork Eel River	Functionally independent
	Bucknell Creek	Potentially independent
	Upper main stem Eel River	Functionally independent
Summer	Redwood Creek	Functionally independent
	Mad River	Functionally independent
	Van Duzen River	Functionally independent
	South fork Eel River	Functionally independent
	Larabee Creek	Functionally independent
	North fork Eel River	Functionally independent
	Upper middle main stem Eel River	Functionally independent
	Middle fork Eel River	Functionally independent
	Upper main stem Eel River	Functionally independent
	Mattole River	Functionally independent

Source: Bjorkstedt et al. 2005.

Steelhead, Southern California DPS

This DPS includes all naturally spawned anadromous steelhead populations below natural and artificial impassable barriers in streams from the Santa Maria River, San Luis Obispo County, California (inclusive) to the U.S.-Mexico border (71 FR 834).

A lack of data combined with an unclear understanding of population dynamics at the southern extreme of steelhead range led the TRT to conclude that classifying individual populations as to their dependence or independence would be overly speculative (Boughton et al. 2006).

The TRT was able to conduct field surveys to determine whether stream systems that were historically known to hold steelhead still had anadromous *O. mykiss* in 2002. They determined that of the 47 stream systems surveyed, 16 were observed to contain juvenile *O. mykiss* (Table H-11). Of the other 31 stream systems, 27 streams either had barriers precluding anadromous steelhead or no fish were observed, and no determination was made for the other four streams (National Marine Fisheries Service 2007).

Table H-11. Populations in the Southern California Steelhead DPS

Population	Extant?
Arroyo Burro	Barrier
Arroyo Hondo	Yes
Arroyo Paredon	Barrier
Arroyo Quemado	Barrier
Arroyo Sequit	Yes
Bell Canyon	Barrier
Big Sycamore Canyon	Negative observation
Canada de la Gaviota	Yes
Canada de Santa Anita	Yes
Canada del Capitan	Negative observation
Canada del Corral	Barrier
Canada del Refugio	Negative observation
Canada del Venadito	Barrier
Canada San Onofre	Negative observation
Carpinteria Creek	Not determined
Carpinteria Salt Marsh Complex	Barrier
Dos Pueblos Canyon	Barrier
Eagle Canyon	Not determined
Gato Canyon	Not determined
Goleta Slough Complex	Yes
Jalama Creek	Negative observation
Los Angeles River	Barrier
Malibu Creek	Yes
Mission Creek	Yes
Montecito Creek	Yes
Oak Creek	Barrier

Population	Extant?
Otay River	Barrier
Rincon Creek Barrier	Barrier
Romero Creek	Yes
San Diego River	Barrier
San Gabriel River	Barrier
San Juan Creek	Negative observation
San Luis Rey River	Barrier
San Mateo Creek	Yes
San Onofre Creek	Dry
San Ysidro Creek	Yes
Santa Ana River	Barrier
Santa Clara River	Yes
Santa Margarita River	Negative observation
Santa Maria River	Yes
Santa Ynez River	Yes
Sweetwater River	Barrier
Tajiguas Creek	Barrier
Tecolote Canyon	Barrier
Tijuana River	Not determined
Topanga Canyon	Yes
Ventura River	Yes

Source: Boughton et al. 2006.

Note: Populations were considered extant based on field surveys and observations of fish.

Steelhead, South-Central California Coast DPS

This DPS includes all naturally spawned anadromous steelhead populations below natural and artificial impassable barriers in streams from the Pajaro River (inclusive) to, but not including, the Santa Maria River, California.

A paucity of data led the Technical Recovery Team (TRT) to conclude that classifying each population's status as independent or dependent would be overly speculative (Boughton et al. 2006). The TRT was able to conduct field surveys to determine whether stream systems that were historically known to hold steelhead, still had anadromous *O. mykiss* in 2002. They determined that of the 37 stream systems surveyed, 35 were observed to contain juvenile *O. mykiss*, while two streams did not have fish (one stream was dry and in the other no fish were observed), and no determination could be made for three stream systems (Table H-12).

Table H-12. Populations in the South-Central California Steelhead DPS

Population	Extant?
Alder Creek	Yes
Arroyo de la Cruz	Yes
Arroyo Grande Creek	Yes
Big Creek	Yes
Big Sur River	Yes
Bixby Creek	Yes
Carmel River	Yes
Cayucos Creek	Negative observation in 2002
Chorro Creek	Yes
Coon Creek	Yes
Diablo Canyon	Yes
Garrapata Creek	Yes
Islay Creek	Yes
Limekiln Creek	Yes
Little Pico Creek	Yes
Little Sur River	Yes
Los Osos Creek	Yes
Malpaso Creek	Yes
Mill Creek	Yes
Morro Creek	Yes
Old Creek	Dry
Pajaro River	Yes
Partington Creek	Yes
Pico Creek	Yes
Pismo Creek	Yes
Plaskett Creek	Yes
Prewitt Creek	Yes
Rocky Creek	Yes
Salinas River	Yes
Salmon Creek	Yes
San Carpoforo Creek	Yes
San Jose Creek	Yes
San Luis Obispo Creek	Yes
San Simeon Creek	Yes
Santa Rosa Creek	Yes
Toro Creek	Yes
Vicente Creek	Yes
Villa Creek	Yes
Villa Creek—Monterey	Yes
Willow Creek	Yes

Note: Populations were considered extant based on field surveys and observations of fish.
Source: Boughton et al. 2006.

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